WHAT IS CLAIMED IS

1. A noise countermeasure determination method comprising the steps of:

(a) calculating recommended circuit information considered to minimize a noise by use of at least one formula, based on input circuit information amounting to at least one net of a target circuit which is to be subjected to a noise analysis; and

(b) comparing the input circuit information and the recommended circuit information, and determining a differing portion of the recommended circuit information differing from the input circuit information, as noise countermeasures.

2. The noise countermeasure determination method as claimed in claim 1, further comprising the steps of:

(c) creating a simulation model of the input circuit information after determining the noise countermeasures in said step (b);

(d) carrying out a circuit simulation using the simulation model, to calculate a signal waveform propagating through a wiring of the target circuit and to check whether or not a noise exceeding a tolerable range exists in the signal waveform; and

(e) categorizing the noise existing as a result of the noise check carried out in said step (d), and optimizing the determined noise countermeasures to only portions related to the

noise.

3. The noise countermeasure determination method as claimed in claim 1, wherein said step (a) outputs a range of a damping resistance as the recommended circuit information, based on a minimum voltage VIH-1 and a maximum voltage VIH-2 which guarantee a normal operation of the target circuit, by taking a damping resistance which makes a first rising voltage of an input waveform at a receiving end of the target circuit equal to the minimum voltage VIH-1 as a maximum value of the range, and taking a damping resistance which makes the first rising voltage of the input waveform at the receiving end of the target circuit equal to the maximum voltage VIH-2 as a minimum value of the range.

4. The noise countermeasure determination method as claimed in claim 3, wherein said step (a) compares a damping resistance which makes a voltage at a time of a ringback equal to the minimum voltage VIH-1 and the minimum value of the damping resistance, and outputs a larger one of the compared values as the minimum value of the damping resistance.

5. The noise countermeasure determination

method as claimed in claim 1, further comprising the step of:

(c) outputting input circuit information which includes as, a wiring length, a Manhattan distance which is determined based on positions of part pins forming the target circuit and a wiring topology.

6. The noise countermeasure determination method as claimed in claim 5, further comprising the steps of:

(d) creating a simulation model of the input circuit information after determining the noise countermeasures in said step (b);

(e) carrying out a circuit simulation using the simulation model, to calculate a signal waveform propagating through a wiring of the target circuit and to check whether or not a noise exceeding a tolerable range exists in the signal waveform; and

(f) repeating said step (d) and said step (e) using a plurality of wiring topologies, and determining an optimum wiring topology from results of the noise check carried out in said step (e) for use in said step (c), so that the optimum wiring topology is determined as the noise countermeasures in said step (b).

7. The noise countermeasure determination method as claimed in claim 1, further comprising the steps of:

(c) creating a simulation model of input circuit information made up of circuit information

of a target net which is to be subjected to the noise analysis and circuit information of an adjacent net which is adjacent to the target net, after determining the noise countermeasures in said step (b);

(d) carrying out a circuit simulation using the simulation model, to obtain a noise combined waveform by combining a crosstalk noise waveform and a signal waveform propagating through the target net which are calculated, and to check whether or not a noise exceeding a tolerable range exists based on the noise combined waveform; and

(e) categorizing the noise existing as a result of the noise check carried out in said step (d), and optimizing the determined noise countermeasures to only portions related to the noise.

8. The noise countermeasure determination method as claimed in claim 7, wherein said step (c) creates the simulation model by assuming that the circuit information of the adjacent net is related to a net which has the same structure as the target net and is adjacent to the target net with a constant pattern gap formed therebetween.

9. The noise countermeasure determination method as claimed in claim 8, wherein said step (c) and said step (d) are repeated while changing the pattern gap, so as to obtain a minimum pattern gap with which the noise obtained as a result of the

noise check carried out in said step (d) does not exceed the tolerable range, and said step (b) determines the minimum pattern gap as the noise countermeasures.

10. A noise countermeasure determination apparatus comprising:

a recommended circuit information calculating section calculating recommended circuit information considered to minimize a noise by use of at least one formula, based on input circuit information amounting to at least one net of a target circuit which is to be subjected to a noise analysis; and

a noise countermeasure determination section comparing the input circuit information and the recommended circuit information, and determining a differing portion of the recommended circuit information differing from the input circuit information, as noise countermeasures.

11. The noise countermeasure determination apparatus as claimed in claim 10, further comprising:

a circuit model creating section creating a simulation model of the input circuit information after determining the noise countermeasures in said noise countermeasure determination section;

a simulation and check section carrying out a circuit simulation using the simulation model, to calculate a signal waveform propagating through a wiring of the target circuit and to check whether or

not a noise exceeding a tolerable range exists in the signal waveform; and

a noise countermeasure optimizing section categorizing the noise existing as a result of the noise check carried out in said simulation and check section, and optimizing the determined noise countermeasures to only portions related to the noise.

12. The noise countermeasure determination apparatus as claimed in claim 10, wherein said recommended circuit information calculating section outputs a range of a damping resistance as the recommended circuit information, based on a minimum voltage VIH-1 and a maximum voltage VIH-2 which guarantee a normal operation of the target circuit, by taking a damping resistance which makes a first rising voltage of an input waveform at a receiving end of the target circuit equal to the minimum voltage VIH-1 as a maximum value of the range, and taking a damping resistance which makes the first rising voltage of the input waveform at the receiving end of the target circuit equal to the maximum voltage VIH-2 as a minimum value of the range.

13. The noise countermeasure determination apparatus as claimed in claim 12, wherein said recommended circuit information calculating section compares a damping resistance which makes a voltage at a time of a ringback equal

to the minimum voltage VIH-1 and the minimum value of the damping resistance, and outputs a larger one of the compared values as the minimum value of the damping resistance.

14. The noise countermeasure determination apparatus as claimed in claim 10, further comprising:

a circuit information output section outputting input circuit information which includes as, a wiring length, a Manhattan distance which is determined based on positions of part pins forming the target circuit and a wiring topology.

15. The noise countermeasure determination apparatus as claimed in claim 13, further comprising:

a circuit model creating section creating a simulation model of the input circuit information after determining the noise countermeasures in said noise countermeasure determination section;

a simulation and check section carrying out a circuit simulation using the simulation model, to calculate a signal waveform propagating through a wiring of the target circuit and to check whether or not a noise exceeding a tolerable range exists in the signal waveform; and

processes of said circuit model creating section and said simulation and check section being repeated using a plurality of wiring topologies, and an optimum wiring topology being determined from

results of the noise check carried out by said simulation and check section for use by said circuit model creating section, so that the optimum wiring topology is determined as the noise countermeasures by said noise countermeasure determination section.

16. The noise countermeasure determination apparatus as claimed in claim 10, further comprising:

a circuit model creating section creating a simulation model of input circuit information made up of circuit information of a target net which is to be subjected to the noise analysis and circuit information of an adjacent net which is adjacent to the target net, after determining the noise countermeasures by said noise countermeasure determination section;

a simulation and check section carrying out a circuit simulation using the simulation model, to obtain a noise combined waveform by combining a crosstalk noise waveform and a signal waveform propagating through the target net which are calculated, and to check whether or not a noise exceeding a tolerable range exists based on the noise combined waveform; and

a noise countermeasure optimizing section categorizing the noise existing as a result of the noise check carried out by said simulation and check section, and optimizing the determined noise countermeasures to only portions related to the noise.

17. The noise countermeasure determination apparatus as claimed in claim 16, wherein said circuit model creating section creates the simulation model by assuming that the circuit information of the adjacent net is related to a net which has the same structure as the target net and is adjacent to the target net with a constant pattern gap formed therebetween.

18. The noise countermeasure determination apparatus as claimed in claim 17, wherein processes of said circuit model creating section and said simulation and check section are repeated while changing the pattern gap, so as to obtain a minimum pattern gap with which the noise obtained as a result of the noise check carried out by said simulation and check section does not exceed the tolerable range, and said noise countermeasure determination section determines the minimum pattern gap as the noise countermeasures.

19. A computer-readable storage medium which stores a program for causing a computer to determine noise countermeasures, said program comprising:

a recommended circuit information calculating procedure causing the computer to calculate recommended circuit information considered to minimize a noise by use of at least one formula, based on input circuit information amounting to at least one net of a target circuit which is to be

subjected to a noise analysis; and

a noise countermeasure determination procedure causing the computer to compare the input circuit information and the recommended circuit information, and to determine a differing portion of the recommended circuit information differing from the input circuit information, as noise countermeasures.

20. The noise countermeasure determination method as claimed in claim 1, further comprising the step of:

(c) carrying out at least one of a circuit rule check and a wiring topology check with respect to the input circuit information.

21. The noise countermeasure determination method as claimed in claim 20, further comprising the step of:

(d) outputting an advice based on a check result obtained in said step (c).

22. The noise countermeasure determination method as claimed in claim 21, further comprising the step of:

(e) correcting the input circuit information based on the advice output in said step (d).